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LONG-TERM RETENTION OF SOCIAL SCIENCE MATERIAL PRESENTED BY PROGRAMED AND CONVENTIONAL METHODS.

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THE EFFECTS OF USING A COMBINATION OF PROGRAMED INSTRUCTION AND CONVENTIONAL TEACHING PROCEDURES ON RETENTION OF SOCIAL SCIENCE MATERIAL WERE STUDIED. THE ORIGINAL LEARNING MATERIAL PERTAINED TO THE PRESIDENT AND THE NATIONAL ADMINISTRATION. MEASURES OF RETENTION WERE OBTAINED BY READMINISTERING AN 80-ITEM CRITERION TEST (APPENDED TO THE REPORT) 19 WEEKS AFTER THE INITIAL ADMINISTRATION. A TOTAL OF 150 SECONDARY STUDENTS PARTICIPATED IN THE ORIGINAL STUDY, AND OF THESE, 124 TOOK THE DELAYED RETENTION TEST. THE FOLLOWING RESULTS WERE OBTAINED--(1) GROUPS WHICH USED PROGRAMING DID NOT DIFFER SIGNIFICANTLY FROM GROUPS TAUGHT IN THE CONVENTIONAL MANNER AT EITHER THE COLLEGE-PREPARATORY OR GENERAL LEVEL, (2) EACH OF SIX GROUPS TESTED EXHIBITED A SIGNIFICANT DROP IN MEAN RETENTION SCORE, AND (3) VARIATIONS IN TEACHER PRESENTATION STYLE DID NOT AFFECT RETENTION. (JH)

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INTRODUCTION

In a number of studies described by Pressey and Robinson (1944), investigators found that only a small percentage of material learned in the classroom was retained over a period of time. Very recently, performance data from Project TALENT which involved nationwide testing of a sample of 440,000 high school students showed similar deficiencies in many subject matter areas. Such results have stimulated research in developing improved methods for effecting better initial learning and long-term retention. One promising method which has evolved in recent years is programed instruction. There is considerable evidence that students who use programs often perform better on immediate tests than students who are taught in a conventional manner. However, relatively little information is available on how the use of programed materials affects long-term retention.

The research described here represents a preliminary study conducted as part of a project concerned with developing techniques for improving the permanency of learning through use of autoinstructional programs for both initial learning and review. Data collected by Goldbeck, Shearer, Campeau, and Willis (1962) conveniently provided the means for studying the effects of using a combination of programed instruction and conventional teaching procedures on relatively long-term retention. The three primary phases of the Goldbeck study were (1) development of effective programed material for use in a one-month unit of a twelfth-grade course in U.S. Government, (2) exploration of various methods for introducing programed instruction in the classroom, and (3) tryout of the most promising of these methods in the actual classroom situation. Analysis of criterion test scores from the final phase of this research yielded the following findings:

(1) classes in which programed instruction was used performed better than comparable non-programed classes,

(2) performance differences in favor of programed classes over non-programed classes were somewhat greater for general-level students than for college preparatory students. However, when achievement differences (grade-point average for two semesters

of U. S. History) were taken into account the between-ability level difference disappeared, and

(3) there were no apparent differences in effectiveness between teachers using programed instruction for students grouped at either the college-preparatory or general levels.

The present study is concerned primarily with the following questions:

(1) What happens to performance differences between programed and non-programed classes over a period of time?

(2) How much retention loss occurred during the 19 weeks between the immediate and delayed tests?

(3) Even if there were no differences in the effectiveness with which they conducted initial instruction employing a composite of conventional and programed methods, do differences in retention appear later between classes taught by different teachers?

METHOD

Material. The original learning material consisted of a linear, constructed-response, autoinstructional program dealing with the President and the National Administration. The program consisted of four sections which together totalled 58 pages. This program segment was the second one of three independent and self-contained segments used in the original study. At the end of a one-week period during which students had used this program segment, an 80-item criterion test (see Appendix) had been administered to all students. To obtain measures of retention, the criterion test was readministered to the participating students 19 weeks later.

Subjects. A total of 150 students, constituting six groups, had participated in the original study. Of these, 124 took the delayed-retention test, the other 26 having been lost through routine attrition. Table 1 shows the arrangement of these students on the basis of the groups in the original study.

TABLE 1

Distribution of Students According to
Original U.S. Government Classes

	Teacher A		Teacher B	
Method	College-Prep.	General	College-Prep.	General
Programed	n = 23	n = 19	n = 22	n = 18
Non-Programed	n = 23	------	------	n = 19

Percentile scores on the Differential Aptitude Test (Verbal) were used to test whether students in the college-preparatory and general groups differed with respect to verbal ability. The difference in mean DAT(V) scores between college-preparatory and general groups was found to be significant ($P < .01$). Differences among college-preparatory and general groups were not significant ($P > .05$). The groups also were compared with respect to achievement, i.e., performance in two semesters of U.S. History as measured by grade-point average. Differences among the college-preparatory groups were not significant ($P > .05$), however, differences among the general groups were significant ($P < .01$). The difference between college-preparatory and general groups was significant ($P < .001$). The average within-group correlation between U.S. History grade-point average and delayed test score was .39.

Procedure. All the participating students were retested simultaneously during a 30-minute assembly period. The students were given a brief explanation of the purpose of the study and were encouraged to do their best. The tests were administered by Teacher B of the original study. The only advance warning the students received was an announcement given at the beginning of the first period that they were to report to the school auditorium.

RESULTS

Programed Versus Non-Programed Groups. Analysis of covariance was used to evaluate differences between programed and non-programed groups with U.S. History grade-point average serving as a predictor variable. At

the college-preparatory level a comparison was made between delayed test scores of Teacher A's group which used programs and the group which he instructed in the regular manner. The difference between the two groups was not significant ($P > .05$). A similar comparison was made at the general level between groups instructed by Teacher B. The difference between the general groups also was not significant ($P > .05$). Table 2 presents delayed test data for students according to the original class grouping.

TABLE 2

Delayed Test Means and Standard Deviations

Method		College-Prep.	General	College-Prep.	General
Programed	Mean	54.83	45.84	53.86	49.28
	S.D.	7.73	9.64	8.96	10.22
Non-Programed	Mean	51.30	----	----	40.79
	S.D.	9.93	----	----	12.09

Retention Decrements. Differences between immediate and delayed test means were analyzed for each of the six groups using an analysis of variance technique described by Wert, Neidt, and Ahmann (1954) for comparing correlated or matched groups. Differences between immediate and delayed test means were significant ($P < .05$) for all six groups. A separate analysis of retention decrements was performed to find out how the various groups compared with respect to retention loss. Analysis of variance of retention decrements revealed no significant differences among the six groups ($P > .05$). Table 3 presents a summary of performance levels of the six groups.

TABLE 3

Percentage of Initial Learning Retained
After 19 Weeks (Corrected for Chance)

	Teacher A		Teacher B	
Method	College-Prep.	General	College-Prep.	General
Programed	80%	72%	79%	79%
Non-Programed	87%	---	---	82%

Teacher Differences. Analysis of covariance was used to compare delayed test scores of programed groups at both the college-preparatory and general levels. Differences between mean scores which could be attributed to teachers were not significant ($P > .05$).

DISCUSSION

The main findings of this study are that (1) use of programs did not enhance delayed retention at either the college-preparatory or the general level, (2) there were marked retention decrements over the 19-week period, and (3) differences in teacher presentation styles did not have a differential effect on delayed retention levels.

Programed Versus Non-Programed Class Groups. Data from this study showed that the initial superiority in favor of programed classes at both levels was not evidenced on retention measures. At both the college-preparatory and general levels, where significant differences had been found on the basis of immediate test scores, no significant treatment differences were obtained using delayed test scores. Alter (1962) found that level of intelligence had a significant effect on level of retention. Wittrock (1963) found a significant interaction between mental age and response mode. Apparently, the ingelligence or aptitude of students using programs does relate to initial performance but how it influences retention is not clear at this time.

Retention Decrements. The rather sizeable retention decrements observed in the present study are consistent with results of a study by Alter (op. cit.) in which retention measures were obtained at various time intervals up to 30 weeks following initial learning. She found significant delayed posttest decrements over time. On the other hand, Wittrock (op. cit.) studied program response modes using material which required "conceptual mediation" and reported a non-significant retention loss for both overt and covert groups over a one-year period. Ripple (1963) describes a study which investigated the effects of active involvement and reinforcement in programed-text material on learning and also investigated claims that programed learning improves retention and reduces individual differences. He concluded that active involvement increased learning but that retention was not improved. His findings are consistent with those of the present study as well as the original Goldbeck study (op. cit.) on which it is based.

Teacher Differences. The possibility that between-teacher differences might manifest themselves on the delayed test was investigated primarily because, although both teachers who participated in the study were highly competent, they nonetheless employed somewhat different styles of presentation. Teacher A's technique can be summarized as consisting primarily of a series of descriptive lectures and explanations during which he cited numerous examples and applications drawn from his personal experience or with which he was familiar. Teacher B's classes can be more appropriately described as lecture/discussions with relatively more emphasis on basic fundamentals. It was hypothesized that college-preparatory students could assimilate these basic fundamentals from programs (or the text) and then derive further benefit from either descriptive lectures or discussions. On the other hand, general students might be expected to benefit more from a quasi-drill situation with greater in-class emphasis on basic information. However, analysis of delayed test scores disclosed no significant between-teacher differences at either the college-preparatory or general level.

SUMMARY

This study investigated the effects of using a combination of programed instruction and conventional teaching procedures on retention of social science material. Measures of retention were obtained by

readministering an 80-item criterion test 19 weeks after the initial administration. The following results were obtained: groups which used programing did not differ significantly from groups which were taught in the conventional manner at either the college-preparatory or general level; each of six groups tested exhibited a significant drop in mean retention score; variations in teacher presentation style did not effect retention differentially.

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APPENDIX

Criterion Test

NAME_____ PERIOD_____

U.S. GOVERNMENT EXAMINATION: THE PRESIDENT AND THE NATIONAL ADMINISTRATION

MULTIPLE CHOICE

Please write the letter in front of the BEST answer in the blank at the left of each question.

____1. To win the election a candidate for the Presidency must have at least:
- A. a majority of the electoral votes
- B. two-thirds of the electoral votes
- C. a majority of the popular votes
- D. a plurality of the electoral votes

____2. In most states the delegates to the national conventions that choose the presidential candidates are chosen by:
- A. the people
- B. the state party conventions
- C. the previous national convention
- D. the County Board of Supervisors

____3. A bill passes Congress and goes to the President for approval or veto. Suppose the President is generally in favor of the bill but thinks it takes in too much territory. Can he approve it in modified form?
- A. Yes, if he has already vetoed it once
- B. Yes, if Congress does not pass it again in its original form
- C. Yes, if it would cost no more in the new form
- D. No

____4. According to the Hatch Act:
- A. no federal employee may participate in a political campaign
- B. no one may give over $5000 to any political committee
- C. persons on relief are not allowed to vote
- D. time off from the job must be given for voting
- E. campaign workers cannot be paid

____5. If the President appointed a new head for the Central Intelligence Agency, the appointment would have to be approved by:
- A. the House of Representatives
- B. the Senate
- C. both Houses of Congress
- D. the Electoral College
- E. the Central Intelligence Agency

____6. The Speaker of the House is next in line after the Vice-President to succeed to the Presidency after the President's death. Formerly the Secretary of State was next in line. The change was made because:

A. it is essential for the person succeeding to the Presidency to be of the same party as the President in order to provide continuity
B. there is always a Speaker of the House but there is not always a Secretary of State
C. it was felt that the Secretary of State already had too much power
D. the Secretary of State is named by appointment and therefore may not reflect the will of the people

____7. In the Electoral College each state of the Union has at least how many votes?

A. One
B. Two
C. Three
D. Four

____8. The State of Colorado sends eight representatives to the House of Representatives. How many votes does it have in the Electoral College?

A. One
B. Three
C. Eight
D. Ten
E. Not enough information is given to answer this question

____9. The only President to serve more than two terms (full terms) was:

A. Woodrow Wilson
B. Franklin D. Roosevelt
C. Harry Truman
D. Theodore Roosevelt

____10 If the Cabinet agrees unanimously on a certain course of action, the President:

A. must follow it
B. must follow it if he cannot convince at least 1/3 of the Cabinet that his point of view is right
C. can do as he likes regardless of what the Cabinet thinks

____11. The Bureau of Mines would be concerned with all of the following <u>except</u>:
- A. raising miners' wages
- B. preventing waste of natural gas
- C. production of a rare gas
- D. development of improved safety helmets for miners
- E. checking the quality of coal used in the furnaces of Army barracks

____12. If the Secretary of State is to be fired, who fires him?
- A. The Department of State
- B. The President
- C. The Senate
- D. The President and the Senate
- E. Both houses of Congress voting together

____13. The independent offices, agencies, and commissions are called independent because they are independent of:
- A. the President
- B. Congress
- C. the major government departments
- D. public opinion
- E. state rule

____14. The <u>chief</u> purpose of the Department of Agriculture is to:
- A. control agricultural surpluses
- B. increase the efficiency of agricultural production
- C. control harmful insects and plant diseases
- D. carry out an educational program
- E. set prices for food and fiber products

____15. All of the following are independent agencies <u>except</u> the:
- A. Federal Civil Service Commission
- B. Interstate Commerce Commission
- C. Federal Communications Commission
- D. National Labor Relations Board
- E. Bureau of Mines

____16. The Department of Labor is most concerned with:
- A. solving unemployment problems arising from automation
- B. keeping wages low enough for American manufacturers to compete with those of Europe
- C. protecting laborers' voting rights
- D. relaxing the immigration laws
- E. providing pensions for disabled veterans

____17. If it were not that they already have too much work to do without it, the work of the various independent boards and commissions of the United States government would be done by the:

A. Senators
B Representatives
C. Supreme Court judges
D. governors of the various states
E. executive departments

____18. The legal arm of our Federal Government is:

A. the F.B.I.
B. the Department of Justice
C. the Supreme Court
D. the legislative branch of the government

____19. The Narcotics Bureau is one of the divisions of:

A. the Department of Commerce
B. the Department of Labor
C. the Department of Health, Education, and Welfare
D. the Treasury Department

____20. If you were Secretary of State today, which of the following would <u>not</u> be a responsibility of your department?

A. Publish all the laws passed by Congress
B. Publish all the proclamations issued by the President
C. Administer the Foreign Service
D. Supervise the collection of tariffs on goods

____21. Social security is administered by the Department of:

A. the Interior
B. Labor
C. the Treasury
D. Health, Education, and Welfare
E. Commerce

____22. If the United States government's State Department follows a foreign policy toward Latin America that is a failure, who ultimately is responsible?

A. The Cabinet
B. The Secretary of State
C. The President
D. Congress
E. The Foreign Service

____23. The Treasury Department of the United States has the power to:
A. lay taxes
B. collect taxes
C. impose duties
D. to borrow money on the credit of the United States

____24. Which one of the following is <u>not</u> an executive Cabinet officer?
A. Attorney-General
B. Secretary of the Interior
C. Secretary of War
D. Postmaster General

____25. The heads of executive departments are also:
A. Foreign Service officers
B. Cabinet members
C. civil-service appointees
D. legislators
E. active party members

____26. The chairman of the Joint Chiefs of Staff is:
A. a civilian appointed by the President
B. a military officer
C. head of the Department of the Army, Navy, or Air Force
D. a military man appointed by the Secretary of Defense
E. the Secretary of Defense

____27. The President and Vice-President are guarded chiefly by the:
A. FBI
B. Civil Service
C. Secret Service
D. Coast Guard
E. Marines

____28. The Department of Defense was established to:
A. improve co-operation among the armed forces
B. make it easier to negotiate with organizations such as NATO
C. make it possible for all military affairs to be administered from the Pentagon
D. prevent too great a centralization of military power
E. give the President more power as commander-in-chief

____29. If you were an employee of the Bureau of Mines, you would be under:

A. the Department of Agriculture
B. the Department of Defense
C. the Department of Commerce
D. the Department of the Interior

____30. Co-operation among the military services has been made especially necessary by the:

A. need for missile and space research
B. reduced authority of the Joint Chiefs of Staff
C. tax burden involved in payments to veterans
D. need for extending defense contracts to small business
E. need for forces that could fight small "brushfire" wars

____31. The Post Office Department loses money every year, chiefly because:

A. the building of new post-offices is carried on in times of depression as a form of work relief
B. the Post Office has to pay part of the expenses of the railroads and highway system over which the mail is carried
C. the Post Office also supports a banking system
D. a great deal of mail is carried at less than cost

____32. The President need not take the advice of his cabinet if:

A. the vote does not reach a majority
B. one cabinet member abstains from voting
C. other competent advice contradicts it
D. he disagrees with it
E. Congress is opposed to it

____33. If you were in the Secret Service, you would be working for:

A. the Department of Justice and the F.B.I.
B. the Navy Department
C. the Treasury Department
D. the State Department

____34. Most of the money for expensive presidential campaigns comes from:

A. state tax funds
B. congressional appropriations
C. contributions of $1000 or less
D. a very few wealthy individual contributors

____35. The powers of the President have been broadened over the years by the action of strong individual Presidents and by:

A. the Constitution
B. the State Legislatures
C. agreement between the two major parties
D. Congress

____36. Which one of the following states would lose most voting power by having a presidential election thrown into the House of Representatives?

A. Alabama
B. Montana
C. Vermont
D. California
E. West Virginia

____37. The Hoover Commission's purpose was to:

A. improve government efficiency
B. strengthen international relations
C. reorganize the Republican Party
D. assist the under-developed nations
E. insure civil rights

____38. Immigration and naturalization affairs are taken care of by the Department of:

A. Health, Education and Welfare
B. Labor
C. State
D. Defense
E. Justice

____39. How are delegates to the national nominating conventions chosen in most of the states?

A. By presidential-preference primaries
B. By popular vote of all voters
C. By state party conventions
D. By caucus of party leaders in the state government

____40. A certain presidential candidate, from out of the state, wins the presidential-preference primary in a very small state. Of what advantage is this to him?

A. The state's delegates are pledged to support him at the national convention
B. He is sure of at least three votes in the Electoral College
C. He becomes a "favorite-son" candidate
D. The state party organization guarantees him campaign expenses

____41. The government tries to limit campaign contributions by any one person, chiefly because:

A. it wants all persons to participate in citizenship activities
B. if one person gave a large sum he might expect favors in return
C. presidential campaigns are already too long and too much of a drain on the energy of the candidate
D. large contributions to one party would put the other at too much of a disadvantage

____42. Power over the United States foreign affairs is divided between the President and the:

A. Congress
B. Supreme Court
C. Department of Defense
D. state governments
E. United Nations

____43. Bureaus of the Department of Commerce do all of the following <u>except</u>:

A. set up qualifications for pilots of private planes
B. predict hurricanes
C. promote overseas trade
D. protect the rights of inventors
E. protect factory workers

____44. How does Congress usually exercise control over members of the Cabinet?

A. By impeaching them
B. Through the President
C. By its power of limiting funds
D. By referendum
E. By the spoils system

____45. A continuing problem of our national defense establishment is:

A. lack of a seat on the Cabinet
B. the Army, Navy, and Air Force carrying on separate but similar work
C. concentration of all research in the Army
D. military ownership of most of the means of defense production
E. civilian control of atomic energy

____46. The head of the Department of Justice is known as the:

A. Chief Justice
B. Attorney General
C. Secretary of Justice
D. Adjutant
E. Secretary General

Classify the President's Powers

In Column B on the right are the different kinds of powers exercised by the President. On the left in Column A are some specific powers. Place the letter of the correct type of power listed in Column B beside the number for each item in Column A.

A		B
____1.	He appoints cabinet members	A. Executive power B. Legislative power C. Judicial power
____2.	He grants pardons	
____3.	He delivers the State of the Union message	
____4.	He sends special messages to Congress	
____5.	He delivers the Budget message	
____6.	He vetoes bills	
____7.	He appoints Federal judges	
____8.	He is Commander-in-Chief of the armed forces	
____9.	He guarantees to every state a republican form of government	
____10.	He conducts foreign affairs	
____11.	He may pocket-veto a bill	
____12.	He grants reprieves	
____13.	He negotiates treaties	
____14.	He grants amnesties	
____15.	He may suspend the writ of habeas corpus in extreme national emergency	

TRUE - FALSE

Please write T or F in the blank at the left of each statement. If a statement is partially false consider it totally false.

____1. Only the President has the power to declare war.

____2. Congress can override a "pocket veto" by a two-thirds vote of both houses.

____3. The National Chairman of each party is generally selected by its presidential candidate.

____4. Although the President may negotiate treaties with foreign contries, all such treaties must be ratified by a two-thirds vote of the Senate.

____5. The President can restrict the power of the legislative branch through use of the veto but he has no control over the judicial branch.

____6. The President can accept part of a bill and veto part of it due to his "item veto" power.

____7. A presidential candidate can receive a majority of the popular votes in the nation and yet receive a minority of the electoral votes.

____8. The Cabinet shares with the President the responsibility for Congressional action in a time of national emergency.

____9. The Patent Office is part of the Department of the Interior.

____10. The FBI is a division of the Treasury Department.

____11. Cabinet members have the right to appear before Congressional Committees and present their views but may not vote on bills.

____12. The President may dismiss a cabinet officer without the approval of the Senate.

____13. The Pure Food and Drug Administration is under the Department of Commerce.

____14. The Department of Commerce is to business what the Department of Labor is to workers.

____15. Independent bureaus and commissions, as well as administrative assistants to the President, are under the jurisdiction of the Departments of the Cabinet.

____16. The U.S. Constitution makes no provision for the President's Cabinet.

____17. The Treasury Department of the United States has the power to "lay and collect taxes, duties, imposts and excises."

____18. The Vice-President now sits in with the President's Cabinet and is a member of the National Security Council.

____19. Independent boards and commissions are usually created by the President.